A-95-32
II-B-7

FINAL TRIP REPORT

NON-CONFIDENTIAL BASED ON COMPANY REVIEW

MEMORANDUM

TO: Juan E. Santiago, Engineer
Minerals and Inorganic Chemicals Group (MD-13)
U.S. Environmental Protection Agency

FROM: Brian L. Palmer, Radian Corporation/RTP

DATE: November 8, 1996

SUBJECT: U.S. Intec, Inc.

REFERENCE: Asphalt Roofing and Processing NESHAP
EPA Contract Number: 68-D1-0117
EPA Project Number: 95/04
Radian Project Number: 652-015-49

1.0 INTRODUCTION AND PURPOSE

The asphalt roofing and processing industry has been included on the list of source categories for which the EPA must develop national emission standards for hazardous air pollutants (NESHAP) under section 112 of the Clean Air Act. The U.S. Intec facility was identified as a producer of modified bitumen roofing products. The purpose of the visit was to collect information on the asphalt roofing manufacturing process, specifically the production of modified bitumen roofing products, potential hazardous air pollutant (HAP) emission sources, and typical control technologies in use on these sources. The information collected will be used in the development of NESHAP for this source category.

2.0 LOCATION AND DATE

U.S. Intec, Inc.
P.O. Box 2845
Port Arthur, Texas 77643

August 24, 1995

3.0 ATTENDEES

Mr. Jeff Hughes, Project Engineer, U.S. Intec, Inc.
Mr. Juan E. Santiago, U.S. Environmental Protection Agency
Mr. Brian L. Palmer, Radian Corporation

4.0 SITE INFORMATION

The U.S. Intec facility in Port Arthur, Texas is a modified bitumen roofing materials plant that began operations in 1982. The facility has the capacity to produce approximately 1,500,000 roofing squares or 67,500 tons of rolled roofing product per year. According to plant personnel, the size of the facility is representative of the approximately twenty roofing product plants in the United States that produce and use modified bitumen. The rolled roofing products consist of 1-meter wide "metric" rolls of polyester or 36 inch wide fiberglass that is saturated with asphalt modified with either amorphous polypropylene (APP) or styrene-butadiene-styrene (SBS) and mineral fillers such as talc or limestone. One surface of the product may be coated with granules.

The facility operates 24 hours per day, 5.5 days per week. The facility operates all year with the exception of a break for Christmas. The manufacturing process takes place in a 44,000 square foot building which also houses 10,000 to 15,000 square feet of office space. Additional buildings on site include a 7,000 square foot research laboratory, a 27,500 square foot warehouse and a 8,000 square foot maintenance building. Production of roofing walkboards and other roofing accessories takes place in the maintenance building.

U.S. Intec operates two other plants in New Jersey and California that produce modified bitumen products. The New Jersey facility uses only APP as a modifier.

4.1 Process Description

The following sections describe each of the major steps in the production of the rolled roofing products at the plant. A list of all the major process tanks and equipment at the U.S. Intec Texas facility is included in Table 1. Confidential

TABLE 1. UNITS OF OPERATION AT U.S. INTEC[a]

Equipment Type (Number)	Capacity	Input Materials	Operating Temperature
Asphalt Storage Tanks (2)	25,000 gallons	Asphalt Flux	325°F-350°F
APP Storage Tanks (3)	N/A[b]	Molten APP	350°F
Batch Scale Tank (1)	N/A[b]	Asphalt and Molten APP	325-350°F
APP Blending Tanks (9)	N/A[b]	Asphalt, APP, Filler	325-350°F
APP Holding Tanks (2)	N/A[b]	APP-Modified Asphalt	325-350°F
SBS Blending Tanks (2)	N/A[b]	Asphalt, SBS, Filler	325-350°F
Line 1 Impregnation Vat[c] and Surfacer	1,300 m/hr	APP-Modified Asphalt, Granules, Talc	374°F
Line 2 Impregnation Vat[c] and Surfacer	1,300 m/hr	APP or SBS-Modified Asphalt, Granules, Talc	338°F-374°F

[a]The order in the table generally follows the material flow order in the production process.

[b]N/A = Not Available.

[c]Similar in function to a saturator as defined in NSPS Subpart UU, but differing in raw materials usage, operating temperature and design.

process descriptions of the U.S. Intec process are also included as Attachment 1.

4.1.1 Asphalt Preparation

Molten asphalt is brought to the plant in tanker trucks and unloaded into one of two 25,000 gallon, thermal oil jacketed asphalt storage tanks. The contents of the tanks are maintained at 163 ^{o}C (325 ^{o}F) for mixing with SBS or 177 ^{o}C (350 ^{o}F) for mixing with APP. Two types of asphalt with different penetration points are used. The asphalt is derived from Venezuelan crude oil and is not oxidized. Fillers are also brought to the plant by truck. Talc is used as the primary filler. Aluminum trihydroxide is also added as a fire retardant for some products. The plant is currently experimenting with replacing talc with limestone, which is less expensive. SBS modifying agents are delivered to the plant in solid form in large tote boxes.

APP is brought to the plant in either molten or solid form. Molten APP is delivered by tanker truck and stored in one of three thermal oil jacketed tanks at 177 ^{o}C (350 ^{o}F). The tanks are blanketed with atmospheric steam to prevent oxygen contamination. Molten and solid APP are available in Texas as byproducts of isopolypropylene production.

Solid APP is also available as off-spec materials from polypropylene textile production. During the visit, APP materials included off-spec diaper liners, decorative ribbon material, and polypropylene fibers, and solid blocks of APP from isopolypropylene production. The physical properties of these raw materials are characterized in a laboratory adjacent to the production area before they are put into production. The formulation of the modified bitumen is adjusted as needed, depending on the raw materials, to achieve a consistent finished product.

To produce APP modified asphalt, asphalt and APP are pumped from the storage tanks into the batch scale tank and weighed. The tank is maintained at 163°C to 177°C (325°F to 350°F) by thermal oil heat. Weighed asphalt is transferred to one of nine blending tanks. APP is added to the blending tanks in steps to allow for mixing. The mixing process takes from 15 to 18 hours.

Filler is added to the blending tanks from preweighed bags. Additional asphalt is added to fill the tank. The mixture is then pumped to one of two holding tanks. Six of the nine blending tanks mix asphalt to be used on site. Three of the tanks are used to mix batches of modified asphalt that will be sent to other U.S. Intec plants.

There are two oil jacketed tanks for blending asphalt with SBS. Asphalt is pumped from the scale tank into one of the blending tanks. Preweighed proportions of SBS are added to the tank. The contents are circulated through a shearing action mixer and returned to the tank. Once mixed, the SBS modified asphalt is pumped into the second SBS blending tank, where a filler is added from preweighed bags. The mixture is then pumped to a holding tank.

The holding tanks for APP and SBS modified asphalt are thermal oil heated and equipped with agitators. Heat to these tanks, as well as the other thermal jacketed tanks, is provided by hot oil circulated in heating coils. There are two oil heaters which are fired by natural gas.

4.1.2 Substrate Saturation

There are two substrate saturation (production) lines. Asphalt modified with APP may be used as a saturant on both Line 1 and Line 2. Asphalt modified with SBS is only used on Line 2. Under normal operations, each line is dedicated to one type of saturant. The substrate saturation (production) lines are fed either a one meter wide polyester substrate, used with asphalt modified with APP or SBS, or 36 inch wide fiberglass substrate, used only with SBS modified asphalt. The lines operate an average speed of 1,300 meters per hour (about 70 feet per minute). The lines can be run faster when a fiberglass substrate is being used than when a polyester substrate is being used.

The substrate is fed through a series of loopers that store substrate to allow the process to continue when one roll of substrate runs out and a new one must be started. The modified asphalt is pumped from the holding tanks to the impregnation vat. The substrate is dipped twice into the modified asphalt in the vat. The impregnation vat temperature is 190°C (374°F) for APP

product and 170°C (338°F) for SBS product. Fumes from the impregnation vats are collected by a canopy hood and vented to the atmosphere. The saturated substrate is fed through a pair of sizing rollers that are set for the desired product thickness. Normal product thickness ranges from two to five millimeters.

In the production of APP modified asphalt smooth surface product, the bottom side of the saturated polyester membrane passes over the surface of a water bath to cool and harden the asphalt coating. A polypropylene "burn off" film is then applied to the still molten top side. (The "burn off" film is so named because it is burned off with a torch when the membrane is installed on a roof; until then, it keeps the finished roll of material from sticking to itself while in storage.) The entire membrane is submerged under water in the second cooling tray. Water from the cooling trays is circulated to cooling ponds and recycled back to the process. Moisture remaining on the membrane is removed by a dryer fan.

Talc is then applied to the back side of the membrane. Fifty pound bags of talc are emptied into a hopper. The talc is dispensed by a manually operated star feeder and spread onto the membrane with brushes. The talc and polypropylene film serve as parting agents, which prevent the rolled product from sticking to itself. Two inking rollers then place an overlap line three inches from each edge. The finished product goes through an accumulator before being automatically wound in ten meter lengths and stacked on pallets. Each roll weighs approximately 40 kilograms (88 pounds).

APP modified asphalt is also used to make a granule-coated product. The process is similar to the one for smooth surface product; however, granules are applied to the top surface of the membrane while the bottom is being cooled. The top surface of the membrane is kept molten with infrared heaters so that the granules will adhere to the top surface. The membrane is submerged in the second cooling tray, but by-passes the talc applicators. A polypropylene burn-off film is applied to the bottom, non-granule side of the membrane. This product is also

wound and cut into ten meter lengths. Normal roll weight is approximately 48 kilograms (105 pounds).

Polyester or fiberglass mat saturated with asphalt modified with SBS is used to make a granule-coated product. After the membrane thickness is determined by the sizing rollers, the bottom surface is cooled and the top surface is heated with infrared heaters. Granules are applied to the top surface. Sand is applied to the bottom surface to prevent the product from sticking to itself when rolled. The talc applicators are bypassed and the membrane is wound in seven and one-half to 15-meter lengths. Normal roll weight is approximately 48 kilograms (105 pounds).

4.1.3 Accessory Products

Some first and second quality roll goods are used to make roofing accessory products in a designated area of the maintenance building. Some rolls are sliced into narrower rolls to use as flashing material. Other roll-goods are cut into 1-meter squares and fabricated into walkboards. The walkboards consist of two 1-meter squares that are heat-welded back-to-back using propane torches. The walkboards are placed on finished roofs to create a more durable pathway to air-conditioning units and other roof-top equipment. There are no controls on the roll slitting or heat welding equipment; no emissions were observed from this equipment during the visit.

4.2 Air Pollution Controls and Emissions

Table 2 describes the air pollution control device for each major piece of equipment and the estimated maximum emission rate for various pollutants according to the plant's air permit, which is included as Attachment 2.

4.2.1 Fume Afterburner

Fumes from the scale tank, blending tanks, and holding tanks are pulled to the afterburner by a blower. The fumes first pass through a dropout box and a preheater that recovers about 75 percent of the heat input to the afterburner. The fumes are heated from 38°C to 582°C (100°F to 1080°F) by the preheater. The afterburner, manufactured by Epcon Industrial Systems, has a

capacity of 12,000 standard cubic feet per minute. It operates at 1400°F with a residence time of 1.5 seconds. According to literature from the manufacturer, the afterburner has a hydrocarbon destruction efficiency of 98 percent. The afterburner is fired by natural gas. Maximum emissions from the afterburner were estimated and included in the plant's air permit. The estimated emissions are presented in Table 3.

TABLE 2. AIR POLLUTION CONTROL EQUIPMENT AND ESTIMATED MAXIMUM EMISSIONS

Equipment	Control Device	Pollutant Emitted	Estimated Maximum Emissions (lb/hr)	Estimated Maximum Emissions (TPY)
Asphalt Storage Tanks (2)	none	VOC	0.37 (per tank)	1.60 (per tank)
Liquid APP Storage Tanks (3)	none	VOC	0.37 (per tank)	1.60 (per tank)
Scale Tank (1)	Fume Afterburner[a]	-	-	-
APP Blending Tanks (9)	Fume Afterburner[a]	-	-	-
SBS Blending Tanks (2)	Fume Afterburner[a]	-	-	-
Holding Tanks (2)	Fume Afterburner[a]	-	-	-
Impregnation Vats (2)	none	VOC	0.50 (per vat)	2.20 (per vat)
Talc Application - Line 1	Bagfilter	PM10[b]	0.15	0.66
Talc Application - Line 2	Bagfilter	PM10[b]	0.15	0.66
Oil Heaters (2)	none	TSP[c]	0.02	0.10
		PM10[b]	0.02	0.10
		VOC	0.02	0.11
		NOx	0.6	2.60
		CO	0.15	0.65

[a]See Table 3 for estimate of maximum emissions from the fume afterburner.

[b]Particulate matter less than 10 microns

[c]Total suspended particulate including PM10

TABLE 3. ESTIMATED EMISSIONS FOR THE FUME AFTERBURNER (INFORMATION TAKEN FROM AIR PERMIT)

Pollutant Emitted	lb/hr Estimated Maximum Emissions	TPY Estimated Maximum Emissions
TSP[a]	0.88	3.85
PM10[b]	0.88	3.85
VOC	5.00	22.00
NOx	3.00	13.00
SO2	0.05	0.22
CO	0.70	3.10

[a]total suspended particulate including PM10

[b]particulate matter less than 10 microns

Table 4 presents the results of emission tests on the fume afterburner for PM, VOC, and opacity. The summary pages from the test report, showing the results of individual runs, are included as Attachment 3.

4.2.2 Impregnation Vats

The impregnation vats on the two production lines are covered by canopy hoods that are vented to the atmosphere. No emissions data are available for the impregnation vats.

TABLE 4. SUMMARY OF EMISSION MEASUREMENTS FOR THE FUME AFTERBURNER FROM TEST CONDUCTED ON SEPTEMBER 23, 1992

Parameter	Value	Emission Rate	EPA Reference Test Method[b]
PM	0.0038 gr/dscf	0.18 lb/hr	5A
VOC	0.63 ppm	0.02 lb/hr	25A
Flow	5,417 dscf/min	N/A[a]	N/A
Opacity	0.0 percent	N/A[a]	9

[a]N/A = not applicable.

[b]40 CFR 60, Appendix A.

4.2.3 Talc Application Baghouses

Talc is applied as a parting agent to one side of the smooth surface product. Both Lines 1 and 2 have talc applicators that are bypassed when smooth surface product is being produced. When talc is being applied, a negative pressure is maintained inside the machine. The machine exhausts to a bagfilter which removes the talc particles from the air stream. Talc removed by the filter elements is returned to the Line 2 applicator. No emissions data are available for the talc applicator baghouses; however, talc is not a HAP.

5.0 CONTROL DEVICE COSTS

The plant operators provided the following estimates for annual operating costs for the fume afterburner:

Natural Gas	$40,000
Electricity	$25,000
Operating Labor	$10,000
Maintenance	$25,000
	$100,000

The operators noted that natural gas costs are relatively inexpensive in Texas compared to most other parts of the country. The estimated capital cost of the fume afterburner, based on a proposal from the vendor, is $321,700 in 1991 dollars (see Attachment 4). The capital cost does not include ductwork, site preparation, utility hookup, or field mechanical work.

ATTACHMENT 1

CONFIDENTIAL PROCESS DESCRIPTIONS

FOR U.S. INTEC, INC.

LOCATED IN CBI FILES

ATTACHMENT 2

TEXAS AIR CONTROL BOARD PERMIT

FOR U.S. INTEC, INC.

TEXAS AIR CONTROL BOARD

12124 PARK 35 CIRCLE, AUSTIN, TEXAS 78753, 512/908-1000

KIRK P. WATSON
CHAIRMAN

BOB G. BAILEY
VICE CHAIRMAN

WILLIAM R. CAMPBELL
EXECUTIVE DIRECTOR

SUZANNE I. AHN, M.D.
JACK V. MATSON, Ph.D., P.E.
CALVIN B. PARNELL, JR., Ph.D., P.E.
WILLIAM H. QUORTRUP
C. H. RIVERS
WARREN H. ROBERTS
MARY ANNE WYATT

February 10, 1993

Mr. J. W. Hughes
Project Engineer
U.S. INTEC, INCORPORATED
P.O. Box 2845
Port Arthur, Texas 77643

Re: Permit Amendment
Permit No. 9436
Asphalt Roofing
Manufacturing Plant
Port Arthur, Jefferson County
Account ID No. JE-0152-Q

Dear Mr. Hughes:

This is in response to your Form PI-1, concerning the proposed amendment to Permit No. 9436. We understand that you propose to increase your afterburner particulate emission from 0.15 lb/hr to 0.88 lb/hr and from 0.66 tpy to 3.85 tpy .

Pursuant to Rule 116.5 of Regulation VI of the Texas Air Control Board, Permit No. 9436 is hereby amended. This information will be incorporated into the existing permit file. Enclosed are revised special provisions pages and a revised maximum allowable emission rates table. Please return the previously issued provisions pages and maximum allowable emission rates table to this office.

This amendment will be automatically void upon the occurrence of any of the following conditions:

1. Failure to begin construction of the changes authorized by this amendment within 18 months from the date of this authorization.

2. Discontinuance of construction of the changes authorized by this amendment for a period of 18 consecutive months or more.

3. Not completing the changes authorized by this amendment within a reasonable time.

3. Not completing the changes authorized by this amendment within a reasonable time.

Your cooperation in this matter is appreciated. If you have further questions, please contact Mr. Patrick Agumadu of our Permits Program.

Sincerely,

Lawrence Eckhardt

For William R. Campbell
Executive Director

Enclosures

cc: Mr. Vic Fair, Regional Director, Beaumont

GENERAL PROVISIONS

9436

1. Equivalency of Methods - It shall be the responsibility of the holder of this permit to demonstrate or otherwise justify the equivalency of emission control methods, sampling or other emission testing methods and monitoring methods proposed as alternatives to methods indicated in the provisions of this permit. Alternative methods shall be applied for in writing and shall be reviewed and approved by the Executive Director prior to their use in fulfilling any requirements of this permit.

2. Sampling Requirements - If sampling of stacks or process vents is required, the holder of this permit must contact the Source and Mobile Monitoring Division of the Texas Air Control Board (TACB) prior to sampling to obtain the proper data forms and procedures. The holder of this permit is also responsible for providing sampling facilities and conducting the sampling operations at his own expense.

3. Appeal - This permit may be appealed pursuant to Rule 103.81 of the Procedural Rules of the TACB and Section 382.032 of the Texas Clean Air Act. Failure to take such appeal constitutes acceptance by the applicant of all terms of the permit.

4. Construction Progress - Start of construction, construction interruptions exceeding 45 days and completion of construction shall be reported to the appropriate regional office of the TACB not later than 10 working days after occurrence of the event.

5. Recordkeeping - Information and data concerning production, operating hours, sampling and monitoring data, if applicable, fuel type and fuel sulfur content, if applicable, shall be maintained in a file at the plant site and made available at the request of personnel from the TACB or any local air pollution control program having jurisdiction. The file shall be retained for at least two years following the date that the information or data is obtained.

6. Maintenance of Emission Control - The facilities covered by this permit shall not be operated unless all air pollution emission capture equipment and abatement equipment are maintained in good working order and operating properly during normal facility operations.

SPECIAL PROVISIONS

9436

EMISSION STANDARDS AND FUEL SPECIFICATIONS

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates," and those sources are limited to the emission limits and other conditions specified in that attached table. Compliance with these permitted emission limits is based on the maximum throughput indicated on Table 2 in the confidential file.

2. Fuel for the afterburner and the three oil heaters shall be sweet natural gas as defined in the General Rules adopted by TACB. Use of any other fuel will require prior approval of the Executive Director of the TACB.

3. These facilities shall comply with all the requirements of Environmental Protection Agency Regulations on Standards of Performance for New Stationary Sources promulgated for Asphalt Processing and Asphalt Roofing Manufacture in Title 40 Code of Federal Regulations Part 60 (40 CFR 60), Subparts A and UU.

OPACITY/VISIBLE EMISSION LIMITATIONS

4. Opacity of emissions from the afterburner and heater stacks shall not exceed 10 percent, averaged over a 6-minute period except for those periods described in Rule 111.111(a)(1)(E) of the TACB Rules and Regulations.

5. There shall not be any visible fugitive emissions leaving the plant's property boundary.

OPERATIONAL LIMITATIONS, WORK PRACTICES AND PLANT DESIGN

6. Bulk atactic polypropylene shall be received and stored in solid form and contain a maximum of 2 percent by volume of volatile material. The bulk material shall be stored in covered containers or sealed packages prior to use in the process.

7. There shall be no detectable odors from the handling or processing of styrene-butadiene-styrene copolymer at this facility.

8. Sampling ports and platform(s) shall be incorporated into the design of the exhaust stack according to the specifications set forth in the attachment entitled "Chapter 2, Stack Sampling Facilities." Alternate sampling facility designs may be submitted for approval by the Executive Director of the TACB.

9. If this facility (or any portion of this facility) exceeds any of the applicable allowable emission rates or other standards, the holder of this permit shall take immediate corrective action to comply with the applicable standards. These actions may include, but are not limited to, reducing operating temperature, reducing throughput, and the installation of additional control equipment. These corrective actions shall not be considered complete until compliance with the allowable emission rates and other standards has been demonstrated. Additional testing may be required.

COMPLIANCE PROVISION

10. Upon being informed at any time by the Executive Director of the TACB that the staff has documented visible emissions from this facility exceeding 20 percent opacity averaged over a 6-minute period, the holder of this permit shall conduct stack sampling analyses or take immediate corrective action to demonstrate compliance.

RECORDKEEPING REQUIREMENTS

11. Daily production records shall be kept and made available for inspection by the TACB and any local air pollution control agency. These records shall be maintained on-site for a period of two years.

12. A copy of this permit shall be kept at the plant site and made available at the request of personnel from the TACB or the local air pollution control agency.

EMISSION SOURCES - MAXIMUM ALLOWABLE EMISSION RATES

9436

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

AIR CONTAMINANTS DATA

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * lb/hr	TPY
2	Talc Baghouse	PM10	0.15	0.66
4	Oil Heater No. 3	TSP	0.02	0.10
		PM10	0.02	0.10
		VOC	0.02	0.11
		NOX	0.60	2.60
		CO	0.15	0.65
6	Line Torches	NOX	0.07	0.32
		CO	0.02	0.08
7	Oil Heater No. 2	TSP	0.02	0.10
		PM10	0.02	0.10
		VOC	0.02	0.11
		NOX	0.60	2.60
		CO	0.15	0.65
10	Line 2 Bagfilter No.1	PM10	0.15	0.66
11	Line 2 Bagfilter No.2	PM10	0.15	0.66
12	Vat No. 1 (4)	VOC	0.50	2.20
13	Vat No. 2 (4)	VOC	0.50	2.20
14	Asphalt Storage Tank No. 1 (4)	VOC	0.37	1.60
15	Asphalt Storage Tank No. 2 (4)	VOC	0.37	1.60
16	APP Storage Tank No. 1 (4)	VOC	0.37	1.60
20	APP Storage Tank No. 2 (4)	VOC	0.37	1.60

EMISSION SOURCES - MAXIMUM ALLOWABLE EMISSION RATES

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	AIR CONTAMINANTS DATA Emission Rates * lb/hr	TPY
22	APP Storage Tank No. 3 (4)	VOC	0.37	1.60
30	Oil Heater No. 1	TSP	0.02	0.10
		PM10	0.02	0.10
		VOC	0.02	0.11
		NOX	0.60	2.60
		CO	0.15	0.65
31	Asphalt Storage No. 3 (4)	VOC	0.37	1.60
32	Afterburner	TSP	0.88	3.85
		PM10	0.88	3.85
		VOC	5.00	22.00
		NOX	3.00	13.00
		SO2	0.05	0.22
		CO	0.70	3.10

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.
(2) Specific point source name. For fugitive sources use area name or fugitive source name.
(3) TSP - total suspended particulate including PM10
PM10 - particulate matter less than 10 microns
VOC - volatile organic compounds as defined in General Rule 101.1
NOx - total oxides of nitrogen
SO2 - sulfur dioxide
CO - carbon monoxide
(4) Fugitive emissions are an estimate only and should not be considered as a maximum allowable emission rate.

* Emission rates are based on and the facilities are limited by the following maximum operating schedule:

Hrs/day_____Days/week_____Weeks/year_____or Hrs/year 8,760

A maximum throughput as indicated on Table 2 in the confidential file.

Revised 2/10/93

ATTACHMENT 3

SUMMARY PAGES OF TEST RESULTS FOR TESTING CONDUCTED

SEPTEMBER 23, 1992 OF FUME AFTERBURNER STACK

TABLE NO. 2

SUMMARY OF SAMPLING RESULTS – Particulates (EPA Parameters)

U. S. INTEC, INC.
PORT ARTHUR, TEXAS

SwL Project No. 54-9207-088

Run No.	Date 1992	Time Period	Net Time (Mins)	Vm (Std) dscf	Ts Stack Temp. degrees F	Vs Stack Velocity ft/sec	Percent Moisture	ACFM Stack Gas Flow	Qsd Dry Stack Gas Flow dscf/hr	Cs Part Conc. gr/dscf	PMRs lb/hr	% Iso.
1	9-23	1020-1230	120	73.425	479	23.37	3.35	9,909.85	324,103.9	0.0037	0.17	93.7
2	9-23	1430-1640	120	80.479	463	23.58	3.38	9,999.68	332,154.6	0.0049	0.23	100.2
3	9-23	1740-1945	120	77.122	468	22.79	3.42	9,666.32	318,812.9	0.0028	0.13	100.0
				Avg.:	470	23.25	3.38	9858.62	325,023.8	0.0038	0.18	

TABLE NO. 3

SUMMARY OF SAMPLING RESULTS – TACB Particulate – Total Catch

U. S. INTEC, INC.
PORT ARTHUR, TEXAS

SwL Project No. 54-9207-088

Run No.	Date 1992	Time Period	C Total Conc. gr/dscf	PMR Total Emissions lb/hr	TACB Allowable lb/hr	% of Allowable
1	9-24	1020-1230	0.0048	0.22	0.15	146.7
2	9-24	1430-1640	0.0053	0.25	0.15	166.7
3	9-24	1740-1945	0.0031	0.14	0.15	93.3
Avg.			0.0044	0.20	0.15	135.6

TABLE NO. 4

SUMMARY OF SAMPLING RESULTS – VOC's

U. S. INTEC, INC.
PORT ARTHUR, TEXAS

SwL Project No. 54-9207-088

Run No.	Date 1992	Time Period	Total Concentration VOC (TnmHC) ppm	Total Emissions VOC (TnmHC) lb/hr	TACB Allowable lb/hr	% of Allowable
1	9-23	1020-1230	1.70	0.02	5.0	0.40
2	9-23	1430-1640	3.60	0.05	5.0	1.00
3	9-23	1740-1945	0.50	0.01	5.0	0.20
Avg.			1.93	0.03	5.0	0.53

TABLE NO. 5

SUMMARY OF SAMPLING RESULTS – Visible Emissions

U. S. INTEC, INC.
PORT ARTHUR, TEXAS

SwL Project No. 54-9207-088

Run No.	Date 1992	Time Period	Average Percent Opacity
1	9-23	1000-1110	0
2	9-23	1440-1550	0
3	9-23	1745-1845	0

ATTACHMENT 4

1191 PROPOSAL FROM EPCON INDUSTRIAL SYSTEMS, INC.

FOR THE FUME AFTERBURNER (THERMAL OXIDIZER) FOR U.S. INTEC, INC

EPCON **INDUSTRIAL SYSTEMS, INC.**

April 11, 1991

U. S. INTEC/BRAI
P.O. Box 2845
Port Arthur, Texas 77643

1-800-392-4216
(409) 724-7024
(409) 724-2348 Fax

Attn: Mr. Jeff Hughes

Proposal #108-91A

Subject: THERMAL OXIDIZER - 12,000 SCFM CAPACITY WITH 70% PREHEAT EXCHANGER

Dear Mr. Hughes:

Epcon Industrial Systems, Inc. is pleased to submit this Proposal for your consideration. This Proposal has been prepared in accordance with our conversations and is based on the requirement for your Texas plant.

EPCON INDUSTRIAL SYSTEMS, INC. HAS BEEN PROVIDING STATE-OF-THE-ART AIR POLLUTION CONTROL EQUIPMENT, BOTH NATIONALLY AND INTERNATIONALLY, TO THE PAINT FINISHING COATING (LIQUID AND POWDER), PRINTING AND LITHOGRAPHY INDUSTRIES, CONTAINER MANUFACTURING, PETROCHEMICALS, SOPHISTICATED AEROSPACE, HIGH TECH ELECTRONICS AND FOOD PROCESSING INDUSTRIES FOR THE PAST FIFTEEN (15) YEARS.

WE ARE A TEXAS BASED CORPORATION WITH THE FULL CAPABILITY OF CUSTOM DESIGNING, MANUFACTURING AND INSTALLING TOTAL AIR POLLUTION CONTROL SYSTEMS, OVENS, DRYERS, FURNACES, WASHERS, PAINT SPRAY BOOTHS, HEAT RECOVERY UNITS AND CONVEYORS.

Under this Proposal we shall furnish the following:

1. A preassembled and pretested Thermal Oxidizer of 12,000 SCFM capacity @100° F. inlet temperature. The exhaust stream comprises of the asphalt fumes contained in your process.

MAILING ADDRESS:
P.O. BOX 7060
THE WOODLANDS, TX. 77387-9990

PLANT ADDRESS:
7745 I-45 SOUTH
CONROE TEXAS 77385-8734

PHONE:
409-273-3300
FAX # 409-273-4600

2. A built-in preheat shell and tube type Heat Exchanger of 70% nominal efficiency as an integral part of the Oxidizer to preheat the exhaust from approximately 100° F. to 1,080° F.

3. The Unit shall be skid mounted and shall be shipped as one single unit.

4. IRI Approved Gas Train for the natural gas fired burner.

5. 480V/3PH/60HZ Power Supply.

6. One (1) 8.0 x 10^6 BTUH capacity Maxon's Combustifume Gas Fired Burner with a 20:1 turn down ratio. Burner shall be aluminum-bronze body suitable for high temperature applications.

7. The Thermal Oxidizer System shall be designed for a continual operating temperature of 1500° F. and a minimum of 1.5 seconds residence time.

8. Hydrocarbon destruction efficiency at optimum operating conditions shall be in excess of 98%.

9. Induced Draft Supply Fan, carbon steel type New York Blower of 22,300 ACFM capacity fan with 75 HP, 480V/3PH/60HZ AC TEFC motor.

10. The Unit shall be designed for outdoor use.

11. Honeywell Burner Management System. (Microcomputer based)

12. Digital Instrumentation.

13. The Oxidizer shall be provided with a number of test ports, view port and inspection doors for testing and maintenance purposes.

14. NEMA-4 Combustion Control Panel with motor starters, temperature controller, high limit, fuses, push buttons, indicating lights, control transformers, logic controller and burner management system.

15. A quantity of four (4) Operation and Maintenance Manuals.

PRICE. . . . . .See separate page

FOB. . . . . .Point of manufacture

DELIVERY. . . . . 12 to 14 weeks after approval to construct (can be improved upon)

TERMS. . . . . .30% with order
30% progress payment**
30% prior to shipment after testing
10% net 30 days after shipment

***Upon 50% completion or 60 days after purchase order, whichever comes first.*

EXCLUSIONS (Can be priced upon request):

1. Duct Work.
2. Stack.
3. Site Preparation.
4. Electrical and Gas Hookup.
5. Field Mechanical Work.

EPCON HAS AN IMPECCABLE REPUTATION IN THE INDUSTRY, BOTH NATIONALLY AND INTERNATIONALLY.

* We are quality and service minded.

* We manufacture very high quality equipment.

* We have a very long list of satisfied customers and the majority of our business is a repeat business.

* We are extremely flexible in working with your requirements and we always deliver more than we promise.

The price herein quoted is firm for a period of Thirty (30) Days and subject to our Terms and Conditions and credit approval. These Terms and Conditions are part of this Proposal and are the basis for acceptance of this proposal and the resulting order or contract. The price does not include sales tax or shipping charges. All payments beyond the due date shall bear a finance charge of 1½% per month.

The system we propose shall be built using the best available technology and complies with present regulatory requirements. Future changes in regulations and standards may necessitate modifications to the system.

Thank you for the opportunity of submitting this Proposal and we shall look forward to your favorable purchase order.

Best regards,

EPCON INDUSTRIAL SYSTEMS, INC.

Christos O. Angelides
Applications Manager

COA/dt
Enclosures

PRICE SHEET

I. THERMAL OXIDIZER CONSISTING OF:

* 12,000 SCFM CAPACITY SKID MOUNTED UNIT
* 70% NOMINAL EFFICIENCY PREHEAT EXCHANGER
* HONEYWELL MICROCOMPUTER BURNER MANAGEMENT SYSTEM
* 22,300 ACFM CAPACITY INDUCED DRAFT FAN
* DIGITAL PROGRAMMABLE TYPE RECORDER/CONTROLLER FOR CONTINUOUS TEMPERATURE MONITORING (FOUR INPUT RECORDER)
* DIGITAL HONEYWELL TEMPERATURE SAFETY HIGH LIMIT
* MAXON OR EQUIVALENT COMBUSTIFUME BURNER
* PREPIPED AND PREMOUNTED IRI APPROVED GAS TRAIN
* RELAYS AND TIMERS LOGIC
* NEMA-4 COMBUSTION CONTROL PANEL (OUTDOOR)
* HYDROCARBON DESTRUCTION EFFICIENCY 98%

PRICE:

Two hundred ninety-eight thousand nine hundred U. S. Dollars.....($298,900.00)

II. STACK:

* 30'-0" FREE STANDING, 3/16" CARBON STEEL STACK, 36" DIAMETER (GUY WIRE PROVISIONS INCLUDED)

PRICE..... $22,800.00

321,700

DESIGN SPECIFICATION

70% NOMINAL EFFICIENCY PREHEAT EXCHANGER

OXIDIZER	
Exhaust Volume	12,000 SCFM
Inlet Temperature	100° F
Hydrocarbon Loading	10-100 Lbs./Hr.
Design Operating Temperature	1,500° F
Hydrocarbon Destruction Efficiency	In Excess of 98%
Dwell Time	1.5 Seconds (Min)
HEAT EXCHANGER	
Preheat Exchanger Efficiency	70%
Type	Shell and tube, Air to Air
Material of the Tube/Tube Sheet	304/316 SS, 18 ga. tube
BURNER	
Type	Maxon Gas Fired Combustifume
Installed Capacity	8.0×10^6 BTUH
INDUCED DRAFT FAN	
Type	NYB Radial
Size	504 DH
Capacity	22,300 ACFM
Motor HP	75 HP
Burner Management System	Honeywell
Gas Train	IRI Approved
Approximate Weight	44,600 Lbs.
Unit Dimension - Approximate	40'-0" L x 12'-0" W x 8'-6" H
Power Supply	480V/3PH/60HZ
DESIGN CALCULATION	
Heat Required to Raise the Exhaust From 1,080° F to 1,500° F	5.544×10^6 BTUH
Hydrocarbon Contribution 100 LB/HR X 15,000 BTU/LB) (maximum Solvent contribution)	1.50×10^6 BTUH
Net Fuel Requirements	4.044×10^6 BTUH
Heat Recovered in the Preheat Exchanger	12.93×10^6 BTUH

SPECIFICATIONS OF THE THERMAL OXIDIZER

12,000 SCFM @100°F

The Thermal Oxidizer shall be designed and fabricated by Epcon Industrial Systems, Inc. The Unit shall be prefabricated as a single unit with insulation, access doors, combustion chamber, burner assembly, gas train controls, components mounted and shipped to the job site in sections or in one piece, depending upon the ease of transportation and installation.

The general arrangement of the Thermal Oxidizer with Heat Recovery System shall be one (1) single assembled unit. The System consists of a Thermal Oxidizer with special gas burners, one (1) forced draft fan, and a built-in Preheat Heat Exchanger of 70% nominal effectiveness Heat Exchanger. The Thermal Oxidizer shall have a capacity of 12,000 SCFM coming in at an approximate temperature of 100° F. The exhaust contains hydrocarbons coming from the process.

INDUCED

CONSTRUCTIONAL DETAILS OF THE INCINERATOR

The outer shell of the Thermal Oxidizer and Heat Exchangers shall be constructed of 3/16" thick carbon steel material. The base shall be constructed of structural steel and shall have required lifting lugs for loading and unloading purposes. The floor shall have high temperature insulation. The walls and roof shall be insulated as follows:

FIRST LAYER:	8# per cu. ft. density mineral wool block insulation, 5" thick - 1200° F. design temperature.
SECOND LAYER:	Ceramic fiber blanket insulation, 1" thick - 1900° F. design temperature.
THIRD LAYER:	High density ceramic fiber board insulation 1" thick - 2300° F. design temperature.

THE THERMAL OXIDIZER BURNER

The Burner shall be natural gas fired, non premixed type. This is a special Burner with grid type of construction. When the Burner is lit, it forms a bed of flames for the gases to pass through and virtually clean themselves. The capacity of the Burner shall be 8.0×10^6 BTUH. The Burner is non premixed type, therefore, it does not require any separate source of combustion air, which has to be heated up to 1500° F. unnecessarily, as this Burner utilizes the oxygen within the exhaust gases. The Burner shall be equipped with an electronic ignition, gas pilot mixture and UV flame scanner and the modulating motor provides the necessary turn down to the Burner.

INDUCED DRAFT FAN

The Fan that we are proposing shall be New York Blower or equivalent, radial blade to handle 12,000 SCFM. The performance capability of the fan shall be as follows:

* 12,000 SCFM at 100° F.
* Radial Blade 504 DH Size.
* 600° F. operating temperature, maximum design.
* Constant V-belt drive.
* OSHA shaft guard and belt guard.
* TEFC 480V/3PH/60HZ, 75 HP motor.

98 VBF@5

PREHEAT EXCHANGER

The Built-In Heat Exchanger shall be air-to-air, shell and tube type to handle 12,000 SCFM maximum at balanced condition with 70% nominal effectiveness. The Heat Exchanger shall be built as an integral part of the oxidizer and shall have access doors, bolt type for cleaning and inspection purposes. The Heat Exchanger is essentially a tube bundle with tubes welded to 14 gauge stainless steel. The tubes shall be Type 304 stainless steel to absorb the thermal shock and provide greater corrosion resistance and shall be in line. The Heat Exchanger shall be designed with necessary expansion joints and the floor shall be insulated with mineral wool similar to the rest of the unit.

The nominal efficiency of the Heat Exchanger shall be 70% and the incoming gases shall be raised from 100° F. to 1,080° F.+. The outgoing gases shall be coming from the Oxidizer on the down stream side and the temperature shall be approximately 1,500° F. The heat recovery in the Heat Exchanger shall be approximately 12.93×10^6 BTUH.

The Heat Exchanger shall be counter flow type and shall have five (5) separate modules connected by expansion joints. Essentially this shall be a five (5) pass heat exchanger.

Air shall flow through the tubes and shall make four (4) 180° turn in the heat exchanger. The exhaust from the oxidizer shall flow over the tubes and shall be discharged to the induced draft fan for either recirculation or to the atmosphere.

PREPIPED MAIN GAS TRAIN IRI APPROVED AND FM APPROVED PILOT LINE

QTY.	DESCRIPTION	EPCON MODEL NO.
2	Gas Cocks	E-AP-XXXX-GC-1.5
1	Gas Pressure Regulator	E-RW-143X-MR-90
1	Low Gas Pressure Switch	E-HW-437H-GP-01
1	High Gas Pressure Switch	E-HW-437G-GP-28
2	Safety Shut Off Valve	E-HW-5055-SS-59
2	Actuators for above	E-HW-4055-VA-19
1	Pressure Gauge, 2" Dial	E-MT-0-30-PG-PS
1	Pressure Gauge, 2" Dial	E-MT-0-15-PG-WC
1	Modulating Motor	E-HW-944E-MM-40
1	Cover Transformer	E-HW-1308-CT-XX
1	Crank Arm Assembly	E-HW-7616-CA-XX
1	Linkage	E-HW-Q100-LI-XX
1	Butterfly Valve	E-HW-V513-BV-59
1	Solenoid Vent Valve	E-AS-8030-SV-83
1/2" PILOT LINE		
2	Gas Cocks	E-AP-XXXX-GC-0.5
1	Pilot Gas Regulator	E-RW-043X-PR-80
1	Pilot Solenoid Valve	E-AS-8215-SP-20
1	Pressure Gauge-2" Dial	E-MT-0-15-PG-WC

NOTE:

* The gas train shall be prepiped and tested at the factory.
* Main and Pilot line shall be prepiped to the burner.
* Quick disconnect unions and couplings shall be used throughout the gas train.
* Any of the above components shall be substituted at Epcon's discretion with equal or better parts.

BURNER MANAGEMENT SYSTEM

The burner in the system shall have the following control features:

DESCRIPTION	EPCON MODEL NO.
Digital Temperature Controller	E-HW-3004-UD-3A
Indicating Type High Limit	E-HW-2005-UD-00
Circular Chart Recorder	E-HW-4200-DR-XX
Micro Computer Burner Control System	E-HW-7000-BC-L1
Programmer Module	E-HW-720L-PM-04
Amplifier	E-HW-R72A-AM-03
Base	E-HW-Q52A-BA-21
Spark Generator	E-HW-Q624-IT-XX
U. V. Scanner	E-HW-7027-UV-XX
~Purge Timer	E-ES-BR18-TI-XX
~Relays	E-PB-XXXX-RE-XX
Control Transformer	E-FR-XXXX-CD-XX
Push-Pull Operator Buttons	E-FR-XXXX-PP-XX
Selector Switches	E-FR-XXXX-SW-XX
Indicator Lights	E-FR-XXXX-PL-XX
Horn	E-FE-0350-AH-XX

NOTES:

1. Any of the components shall be substituted at Epcon's discretion with equal or better components.
2. Relays and Timers may be replaced by a Programmable Controller (Add $1,850.00).
3. The combination of Temperature Controller and separate Chart Recorder can be replaced with a state-of-the-art Programmable Recorder/Controller (E-HW-4501-CL-10 or E-HW-450T-TL-10).

The system proposed shall be equipped with a four (4) input programmable type Recorder/Controller.

The burner in the system shall be controlled as follows for temperatures:

1. Thermocouple located in the system senses the average temperature.

2. Temperature controller receives the signal from the thermocouple and it drives the modulating motor thus opening the butterfly valves until the temperature reaches the desired temperature within +/- 5° F.

3. Indicating type, high limit shuts down the burner when the temperature reaches the preset limit.

4. Modulating motor controls the butterfly valve in the gas train, rate of gas flow controls the temperature in the system.

5. When the preset operating temperature is reached, the burner operates with minimum fuel input.

ADDITIONAL FEATURES

* NEMA-4 Control Panel.

* Audio-visual annunciator to indicate flame failure.

* Manual gas cocks on the gas train.

* Pilot train.

* Necessary pressure gauges to monitor the pressure in the system.

* Air flow switches to interlock with the burner.

* Auxiliary contacts in the motor starters, for interlocking.

ANY OF THE ABOVE COMPONENTS SHALL BE SUBSTITUTED AT EPCON'S DISCRETION WITH EQUAL OR BETTER COMPONENTS.

INSTALLATION SUPERVISION AND DOCUMENTATION

Epcon Industrial Systems, Inc. is pleased to offer a Preventative Maintenance Program. This offer is made in conjunction with our Proposal and is issued as an option.

The purpose of the service is:

1. To fine-tune the System to field operating conditions for optimum performance per design.

2. To have the System checked by a trained and skilled engineer. (We must emphasize the importance of the System being checked out by a factory engineer/technician.)

   Even though the System has been started and tested at the factory prior to shipping, it is important that the System is checked out and started by a trained and skilled engineer from the factory during final installation. This ensures against any problems that may have arisen during shipping or a System that has been stored for some time after testing.

3. To ensure satisfactory training of the operators so that they may have complete confidence and fully understand the System.

DOCUMENTATION

1. Clarify Operation and Maintenance Manuals, and "As Built Drawings". Operator's manuals shall specify the following:

   * Theory of Operation of the System.
   * Trouble Shooting Points.
   * Maintenance Schedule.
   * Literature on all the controls and procured components.
   * Start-Up and Shut-Down Procedure.
   * Spare Parts List.

2. Indoctrinate on Start-Up and Shut-Down Procedure.

3. With the literature, indicate all the control components.

Our services may be utilized for Start-Up, for Maintenance or for both. You may choose from the following options:

1. Ten (10) working days at $6,500.00 plus out-of-pocket expenses.

2. $650.00 per day per person plus out-of-pocket expenses.

WORK AND MATERIAL TO BE SUPPLIED BY PURCHASER

1. Purchaser shall provide whatever utilities are required for the system such as, but not limited to, 480V/3PH/60HZ and 120V/1PH/60HZ power, or any other voltage and phase combination, fused disconnect means in accordance with NEC regulation. Natural gas at 10 PSI with 1,000 BTU/CFT heating value. Compressed air (80 PSI) and water, at required pressures. Oil - Filtered at 60 PSI (where applicable).

2. Purchaser has the responsibility of unloading all the equipment in strict accordance with our recommendations and locating in approximate position on or near installation site, and inspecting the system for any damage. Purchaser must enter claims against common carrier for any damage or lost merchandise, before accepting shipment.

3. Purchaser must furnish safe storage area under the roof and guard the material shipped to the job site against loss, theft, or any damage in handling the equipment on the job-site.

4. Provide all utilities with proper disconnects and valves to manifolds, electrical control cabinets and to our piping as per our drawings. If installation is furnished by the seller, purchaser shall furnish utilities such as electric power, 480V/3PH/60HZ, 120V/1PH/60HZ for hand tools, welding machines, compressed air, potable water at no charge to seller.

5. Purchaser shall provide all the necessary foundation, site preparation, level floor, anchors, floor drains, floor or roof work and roof penetrations, covered building, if necessary.

6. Purchaser shall obtain all the necessary construction and operating permits, as may be required. Any and all performance testing by third party shall be purchaser's responsibility.

7. Purchaser shall be responsible for any local, state and federal or any other taxes.

8. Stack and stack installation is excluded from this price unless priced separately.